

CLAIMS:

Claim 1. A piezoelectric device comprising:

a piezoelectric vibrating reed having excitation electrodes,
a package with outer terminals into which the piezoelectric vibrating reed is mounted; and
a strip of insulating material having electrical conductors in the form of wiring patterns disposed thereon for forming an insulating bonding ("TAB") tape, with said TAB tape being interposed in said package such that the excitation electrodes of said piezoelectric vibrating reed are interconnected to the outer terminals of the package through the conductive wiring patterns on said TAB tape.

Claim 2. The piezoelectric device according to claim 1,

wherein said TAB tape includes a opening or a plurality of openings in the form of windows extending therethrough;

wherein the wiring patterns are formed on a surface of insulating tape facing mounting electrodes;

wherein the wiring patterns are formed on the surface of the insulating tape with portions of the wiring patterns overlying the windows; and

wherein the piezoelectric vibrating reed is mounted on the TAB tape with the excitation electrodes connected to the wiring pattern via said windows.

Claim 3. The piezoelectric device according to claim 2,

wherein said TAB tape includes mounting terminals upon which the piezoelectric vibrating reed is mounted with said mounting terminals composed of a portion of said

wiring patterns extended from said surface for connection to said excitation electrodes.

Claim 4. The piezoelectric device according to claim 3,

wherein the mounting terminals are located in an elevated plane spaced apart from the plane of said TAB tape

Claim 5. The piezoelectric device according to claim 2,

wherein the TAB tape is connected to the piezoelectric vibrating reed in the package by means of bumps of conductive material or solder.

Claim 6. A method for manufacturing a piezoelectric device including a piezoelectric vibrating reed, excitation electrodes, and a package having a package base with outer terminals, the method comprising the steps of:

forming an insulating bonding (“TAB”) tape composed of a plurality of electrical conductors formed on an insulating material with each of the plurality of electrical conductors disposed in an arrangement forming predetermined winding patterns;

mounting the piezoelectric vibrating reed on the TAB tape such that the excitation electrodes make contact with said winding patterns; and

installing the TAB tape in the package having the piezoelectric vibrating reed mounted on said a-package base such that said winding patterns make contact with the outer terminals.

Claim 7. A method according to claim 6 further comprising:

wherein said TAB tape has openings formed in said insulating material to provide windows therethrough with said winding patterns formed on a surface of said insulating material such that a portion thereof overlies said windows; and

displacing said portion through said windows such that mounting terminals are formed lying at an elevated position relative to said surface for mounting the piezoelectric vibrating reed with said mounting terminals containing said portion of winding patterns.

Claim 8. A method for manufacturing a piezoelectric device including a piezoelectric vibrating reed, excitation electrodes, and a package having a package base with outer terminals, the method comprising:

forming an insulating bonding (“TAB”) tape composed of a plurality of electrical conductors formed on an insulating material with each of the plurality of electrical conductors disposed in an arrangement forming predetermined winding patterns;

installing the TAB tape in the package on said a package base such that said winding patterns make contact with the outer terminals; and

mounting the piezoelectric vibration reed on the TAB tape following its installation on the package base such that the excitation electrodes make contact with said winding patterns.

Claim 9. A method according to claim 8 further comprising:

wherein said TAB tape is in the form of a strip having a fixed length and has openings formed in said insulating material to provide windows therethrough with said winding patterns formed on a surface of said insulating material such that a portion thereof overlies said windows;

displacing said portion through said windows such that mounting terminals are formed lying at an elevated position relative to said surface for mounting the piezoelectric vibrating reed on said mounting terminals and

wherein the piezoelectric vibrating reed has a length commensurate with the length of said TAB tape.

Claim 10. The piezoelectric device according to claim 1,

wherein said TAB tape includes mounting terminals upon which the piezoelectric vibrating reed is mounted with said mounting terminals composed of a portion of said wiring patterns extended from said surface for connection to said excitation electrodes.

Claim 11. The piezoelectric device according to claim 10,

wherein the mounting terminals are located in an elevated plane spaced apart from the plane of said TAB tape.

Claim 12. The piezoelectric device according to claim 10,

wherein the TAB tape is connected to the piezoelectric vibrating reed-in the package by means of bumps of conductive material or solder.